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April 3, 2006
L-06-020

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555-0001

**Subject: Beaver Valley Power Station, Unit Nos. 1 and 2**
**BV-1 Docket No. 50-334, License No. DPR-66**
**BV-2 Docket No. 50-412, License No. NPF-73**
**Supplemental Response to Generic Letter 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors "**

This letter provides additional information regarding the FirstEnergy Nuclear Operating Company (FENOC) response to Generic Letter 2004-02 for Beaver Valley Power Station (BVPS), previously provided in letter L-05-146, dated September 1, 2005. The generic letter requested addressees to perform a mechanistic evaluation of the potential for the adverse effects of post-accident debris blockage and operation with debris-laden fluids to impede or prevent the recirculation functions of the emergency core cooling system (ECCS) and containment spray system (CSS) following all postulated accidents for which the recirculation of these systems is required.

In Response 2(b) of Attachment 1 to the September 1, 2005 letter, two options were described for modifying the Recirculation Spray System (RSS) pump start signal. Option 1 would extend the existing start delay of the RSS pumps. Option 2 would replace the time delay with a start signal linked to Refueling Water Storage Tank (RWST) level. Option 2 has been selected based upon analysis results, greater strainer surface area, and greater net positive suction head (NPSH) margin. Since technical specifications currently specify a time delay, a license amendment request will be submitted in September 2006 to support the implementation of Option 2 at both units.

Response 2(b) also described prototypical testing of the proposed strainer design to validate the results of the debris bed head loss evaluation. A single test covering both units was planned to be completed by the first quarter of 2006. However, since analysis results indicate the need for different strainer designs at each unit,

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two tests will be performed instead of a single test as originally anticipated. Due to product availability and coordination with other testing activities, BVPS-2 strainer prototype testing is now scheduled to be completed in April 2006. The BVPS-1 design configuration differs significantly from BVPS-2 in that horizontal strainer elements are planned rather than vertical ones. Therefore, a separate test window is now planned for the BVPS-1 prototype and this will be completed in August of 2006.

In Response 2(d)(v), the High Pressure Safety Injection (HPSI) throttle valves were noted as presenting the limiting downstream opening size. At BVPS-2, the valve gap is smaller than the opening in the new sump strainer. Therefore, a modification will be undertaken to increase the limiting gap size. This will be implemented during the Spring 2008 refueling outage (2R13) along with the RSS pump RWST level signal change. The wear analysis per the WCAP-16406-P evaluation is still in progress.

Implementation of the HPSI throttle valve modification and the RSS pump start signal modification during the Spring 2008 refueling outage (2R13) at BVPS-2 is approximately 3 months beyond the requested date for implementation of corrective actions (December 31, 2007) specified in the generic letter. The normal allowance for obtaining a license amendment (one year) would not be adequate to obtain and implement an amendment by the end of the Fall 2006 outage (2R12). It is requested that the NRC permit completion of BVPS-2 modifications during 2R13 to allow adequate time to properly design and install the modifications and to prepare and obtain NRC approval of an associated license amendment. Throttle valve modifications cannot be performed on-line because there are no isolation valves between the throttle valves and the reactor coolant loop piping. RSS pump start signal modifications would also be performed off-line because wiring changes to the solid state protection system are required. This schedule would also allow for walkdown of the proposed modifications during 2R12 (i.e., in advance of implementation), and adequate time to identify replacement hardware for the HPSI throttle valves, analyze them for potential wear, and for procurement and manufacture. The first planned outage after 2R12 is 2R13.

The new strainer would be installed more than a year in advance of the implementation date specified in the generic letter and would provide increased surface area and improved filtering capability. Improved filtering capability would be achieved by strainer elements with round openings that impede particle sizes permitted by the currently installed square mesh screen of the same dimension, and

by the distribution and shape of the multiple strainer element configuration which makes overall clogging less likely than the simple sump screen that is currently installed. Improved structural characteristics would be an additional benefit. NPSH margins would remain acceptable using current licensing basis calculation methodology. It has been previously determined by evaluation that the nature of debris reaching the HPSI throttle valves would allow it to be pushed through by the high pump discharge pressure assuming that particle size may still be larger than the smallest valve seat gap after passing through the pumps. Improved strainer design would further limit debris quantity and size. Therefore it is believed that operation with the existing valve gaps after installation of the modified sump strainer would not impede or prevent recirculation functions required by 10 CFR 50.46 and General Design Criteria 38 and 41.

The modification of the RSS pump start signal provides additional sump water level to allow a much larger submerged screen flow area before the Recirculation Spray Pumps start. This allows for greater debris loading than the current licensing basis assumes. In the interim condition, the new screen provides a submerged flow area that corresponds to the submerged area in the current screen at the time that the RSS pumps start. However, the new screen provides a much larger total strainer area that is rapidly submerged as the containment sump continues to fill during the LOCA transient. So, the increasing submerged strainer flow area provides additional clean screen flow area to continue to provide suction flow, even if the debris load were much larger than the current design basis. Emergency operating procedures contain provisions for monitoring RSS pumps for cavitation and for taking appropriate action to delay pump start until the water level has increased. This is in essence what the modification to the RSS pump start signal will accomplish automatically. Therefore it is believed that operation with the existing RSS pump start signal and procedural measures for monitoring RSS pumps in addition to installation of the modified sump strainer would not impede or prevent recirculation functions required by 10 CFR 50.46 and General Design Criteria 38 and 41.

Interim compensatory actions described in response to NRC Bulletin 2003-01 would also be maintained at least until all modifications are completed. Therefore, it is believed that implementation of the HPSI throttle valve modification and the RSS pump start signal modification during 2R13 at BVPS-2 is an acceptable schedule.

The impact on risk of implementing the HPSI throttle valve modifications and RSS pump start signal modification after the implementation date specified in the generic letter is very low. This is because the approximate three month time period prior to implementing these modifications is relatively short, the new sump strainer design will make clogging less likely at the strainer and downstream, and because procedure provisions for monitoring the RSS pumps for cavitation and for taking appropriate actions are provided. Contingency actions to provide emergency makeup to the RWST, in the unlikely event that the containment sump becomes clogged would also be in effect. It is not expected that the HPSI throttle valves would clog even with the current sump screen. Therefore, the modification to these valves would provide an additional measure of assurance to satisfy newer analysis guidelines, but impact on risk is considered to be very low.

The attachment to this letter provides a list of regulatory commitments made in this submittal. If there are any questions or if additional information is required, please contact Mr. Gregory A. Dunn, Manager – FENOC Fleet Licensing, at (330) 315-7243.

I declare under penalty of perjury that the foregoing is true and correct. Executed on April 3, 2006.

Sincerely,

James H. Lash

Attachment:
List of Regulatory Commitments

c: Mr. T. G. Colburn, NRR Senior Project Manager
Mr. P. C. Cataldo, NRC Senior Resident Inspector
Mr. S. J. Collins, NRC Region I Administrator
Mr. D. A. Allard, Director BRP/DEP
Mr. L. E. Ryan (BRP/DEP)

**ATTACHMENT to L-06-020**

Commitment List

The following list identifies those actions committed to by FirstEnergy Nuclear Operating Company (FENOC) for Beaver Valley Power Station (BVPS) Unit Nos. 1 and 2 in this document. Any other actions discussed in the submittal represent intended or planned actions by FENOC. They are described only as information and are not regulatory commitments. Please notify Mr. Gregory A. Dunn, Manager – FENOC Fleet Licensing, at (330) 315-7243 of any questions regarding this document or associated regulatory commitments.

| Commitment | Due Date |
|---|---|
| 1. Prototype testing of proposed BVPS-2 strainer design. | April 2006 |
| 2. Prototype testing of proposed BVPS-1 strainer design. | August 2006 |
| 3. Submit BVPS-1 and BVPS-2 license amendment requests reflecting modified RSS pump start signals. | September 2006 |
| 4. Install BVPS-2 modifications to increase the HPSI throttle valves gap. | Spring 2008 Refueling Outage (2R13) |